

CLAIMS

1. Continuous process for the hydrogenation of compounds comprising nitrile or nitro functional groups to amine or aminonitrile compounds in the presence of a heterogeneous hydrogenation catalyst in divided form and of a basic compound characterized in that it consists in:
- feeding, into a stirred reactor:
 - 10 . a first stream, of reactant to be hydrogenated,
 - . a second stream, of catalyst,
 - . a third stream, of basic compound and
 - . a fourth stream, of hydrogen in order to
 - 15 maintain the reactor under a pressure of hydrogen;
 - withdrawing, from the reactor, at least a fifth stream consisting of the reaction mixture and including hydrogen bubbles dispersed in the said mixture;
 - 20 - making this fifth stream circulate in at least one loop, which runs into the bottom and the top of the reactor, and removing, by heat exchange with the said fifth stream, the heat produced by the hydrogenation reaction so as to maintain the reaction mixture at a
 - 25 temperature below 150°C;
 - withdrawing, from this fifth stream circulating in one of the loops, a sixth stream containing a

portion of the hydrogenate separated from the catalyst;
and

- withdrawing, from the reactor or from one of the
circulation loops, a seventh stream, of hydrogenate
5 which is fed into a liquid/solid separation step, and
recovering the liquid phase containing the catalyst-
free hydrogenate and the solid phase formed by the
catalyst, the said solid phase being treated in order
to be regenerated before being recycled into the
10 second, catalyst stream.

2. Process according to Claim 1,
characterized in that the heat is removed by a heat
exchanger placed downstream of the said withdrawal of
the sixth stream of hydrogenated compounds in the
15 circulation loop for the said fifth stream.

3. Process according to Claim 1 or 2,
characterized in that an eighth stream of the reaction
mixture is withdrawn from the reactor and circulated in
a second loop before being recycled into the reactor,
20 the heat being removed by a heat exchanger placed in
the said circulation loop for the eighth stream.

4. Process according to one of the
preceding claims, characterized in that the sixth
stream is withdrawn through a filter medium.

25 5. Process according to Claim 4,
characterized in that the filter medium is a porous
medium placed tangentially to the direction of the
fifth stream circulating in the loop.

6. Process according to Claim 4 or 5, characterized in that the porous medium is made of metal.

7. Process according to Claim 4 or 5, characterized in that the filter medium comprises a membrane placed on a support.

8. Process according to one of the preceding claims, characterized in that the reaction mixture includes a solvent.

9. Process according to one of the preceding claims, characterized in that the reaction mixture includes water, ammonia or an alcohol.

10. Process according to Claim 9, characterized in that the reaction mixture comprises from 1.5% to 7% by weight of water with respect to the liquid mass of the reaction mixture.

11. Process according to one of Claims 1 to 10, characterized in that the liquid/solid separation carried out on the seventh stream is a settling, filtering or centrifuging step.

12. Process according to Claim 11, characterized in that the liquid/solid separation is carried out in a device comprising an upper portion having a bottom in the form of a cone, and a pipe of small cross section extending from the end of the cone, a means for moving the solid being placed in the pipe of small cross section, the reaction mixture being fed into the said upper portion, the liquid phase separated

from the solid being withdrawn from the said upper portion, and the settled solid being recovered from the bottom of the pipe of small cross section.

13. Process according to Claim 12,
5 characterized in that water is introduced into the pipe of small cross section.

14. Process according to one of the preceding claims, characterized in that the solid phase recovered is subjected to a catalyst regeneration step.

10 15. Process according to Claim 14, characterized in that the regenerated catalyst is fed into the second, catalyst stream.

16. Process according to one of the preceding claims, characterized in that the second,
15 catalyst stream consists of a mixture comprising the catalyst, a basic compound and optionally a solvent in which the basic compound is insoluble, the basic compound/catalyst ratio being between 0.1 mol and 50 mol of basic compounds per 1 kg of catalyst.

20 17. Process according to Claim 16, characterized in that the catalyst in the second, catalyst stream is a mixture of fresh catalyst and regenerated catalyst.

18. Process according to one of the
25 preceding claims, characterized in that the catalyst is a Raney nickel or a Raney cobalt comprising between 2% and 6% by weight of aluminium and optionally a dopant chosen from the metals in the group: chromium,

titanium, molybdenum, copper, tungsten, iron, zinc, rhodium and iridium.

19. Process according to one of the preceding claims, characterized in that the polynitrile
5 compound is adiponitrile.